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PRELIMINARY ANALYSIS OF MISSILE- OR SPACE- ASSOCIATED FACILITIES AT EMBA, USSR

Report No. 100-1000-1000-1000

Guided Missiles and Astronautics Intelligence Committee

United States Intelligence Board

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Published by

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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The overall content of this report reflects the current views of the Guided Missiles and Astronautics Intelligence Committee, based on the best available evidence. The photographic interpretations provided by NPIC which constitute part of the evidence are, however, tentative; subsequent, more detailed analysis may result in their revision. The GMAIC acknowledges the support in the preparation of this report provided by NPIC, which contributed photo interpretation, editorial, graphical, and reproduction services.

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INTRODUCTION

A significant complex of facilities is under construction south of Emba, a town north of the Aral Sea, at 48-46N 58-03E (Figure 1). As revealed by intercepted Soviet communications and aerial photography, the activity is readily associated with the Soviet missile and/or space program. It appears to consist of an instrumented range containing at least 11 instrumentation sites which form a bell-shaped pattern extending approximately 35 nautical

miles (nm) in a south-southwestern direction, a probable launch area, an airfield with a 7,500-foot runway, and 2 support areas (Figures 2 and 3). In view of this development, the Guided Missile and Astronautics Intelligence Committee established a special group to work with the National Photographic Interpretation Center in determining the probable mission of the facility at Emba. This report represents the results of the study based on present evidence.

CONCLUSIONS

1. Our analysis of the Emba facility indicates that it is a missile-launch and -support facility of substantial magnitude.
2. Emba is a research and development facility rather than an operational-type missile facility.
3. The facility was still under construction in October 1962 but now may be ready for launching its first missile. No missile firings

from this installation have been identified to date.

4. The particular types of missiles to be launched from Emba cannot be determined at this time. We believe this facility to be capable of launching short-range SSMs, polar satellites, anti-satellite vehicles, or SAMs. However, we do not think the Soviets intend to develop ABMs at this facility.

DISCUSSION

I. EVIDENCE OF DEVELOPMENT

A. Photographic

1. This facility was first observed on

The only adequate coverage of the area prior to this date was

which shows no evidence of a railroad or construction activity in the area.

Therefore, development of the facility was initiated sometime after

2. Since the following four missions have provided fair photography of this facility:

Analysis of these missions indicates that construction activity is still in progress at this facility.

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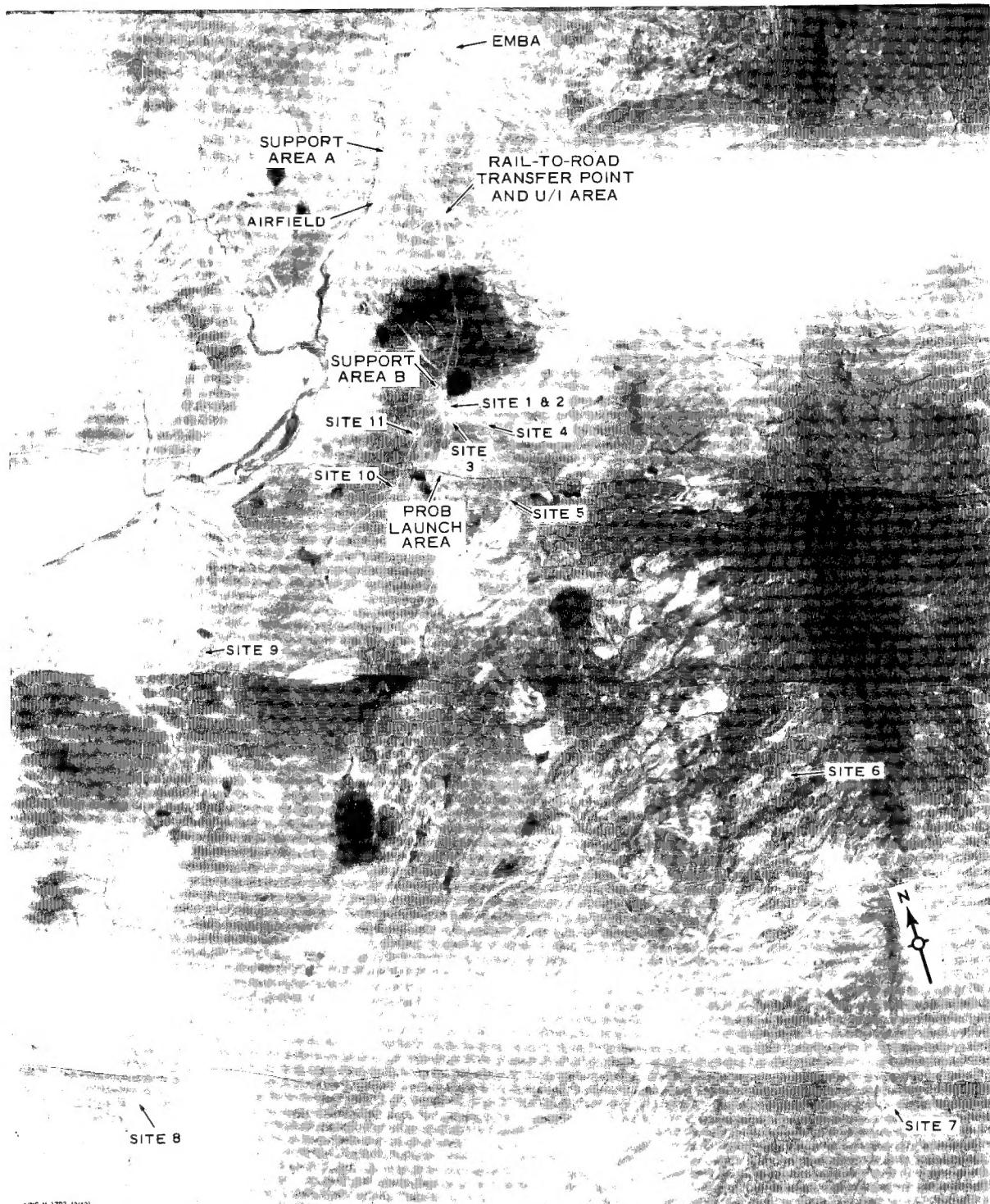
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FIGURE 1. LOCATION OF EMBA.



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Between [redacted] construction activity continued at the five major instrumentation sites (Sites 2, 6, 7, 8, and 9), at least 25 buildings were added to the rail-served support area, the airfield was improved, new roads were constructed, and new cable scars were made.

B. Flight Activity

1. General

The beginning of flight activity at Emba with a General Purpose Transport Unit (GPTU) flight in October 1960 suggests that construction was started at that time or that the area was being surveyed for subsequent construction. High-level Soviet military and electronics research and development interest in Emba is evident from the considerable flight activity in the area since October 1960. Except for one flight to Emba by an aircraft subordinate to the State Committee for Aviation Technology (GKAT) based at Moscow/Khimki Airfield, however, there has been no other association of Emba with missile research and development and production activities. This may indicate that the Emba facility has not yet reached the operational stage. Even so, associations with such missile-related activities would have been expected if Emba is a launch facility. There have been, however, visits to Emba by missile test range support aircraft based at Vladimirovka Airfield. The usual flight activity patterns seen at known Soviet missile test ranges have not been evident at Emba; however, tenuous data suggests that from four to six probable military transports are based at Emba to provide local support.

2. Specific flight activities

a. In October 1960, October and December 1961, and October and November 1962, aircraft subordinate to the General Purpose

Transport Unit (GPTU) based at Moscow/Shchelkovo Airfield visited Emba. These visits indicate interest in Emba at the highest levels of the Soviet military establishment and may be related to inspection of construction progress. It may be significant that in association with visits to Emba, these aircraft also visited Orenburg or Donguz enroute to or from base.

b. In October 1960; November and December 1961; April, May, August, September, and December 1962; and January 1963; GKAT aircraft based at Moscow/Orlovo Airfield visited Emba. These visits indicate an electronics interest possibly related to instrumentation. The aircraft involved are believed to support NII 17 in Moscow, an electronics research and development facility, and have been noted in activity associated with Soviet missile test ranges.

c. [redacted]

IL-28 jet light bombers subordinate to a unit (T-2460) of the Tactical Air Force, Turkestan Military District (TAF TURK MD) at Fergana flew to Emba. These flights may have conducted special calibration or air photo surveys of Emba. These aircraft have been scheduled for such activities over the Fergana Valley and other locations in Turkestan Military District.

d. Transport aircraft subordinate to the Tactical Air Force, Turkestan Military District (TAF TURK MD) and probably based principally at Fergana have provided primary local support for developments at Emba. LI-2, AN-2, and MI-4 aircraft have been involved in this activity. These aircraft have been scheduled or active primarily on local round-trip flights from Emba to Aktyubinsk, Orenburg, and the Aralsk area, and on probable shuttle flights between Tashkent and Emba. These aircraft also have been active between Emba and Tyura Tam [redacted] Sverdlovsk/Koltsovo Airfield [redacted] Moscow/Ostafyevo Air-

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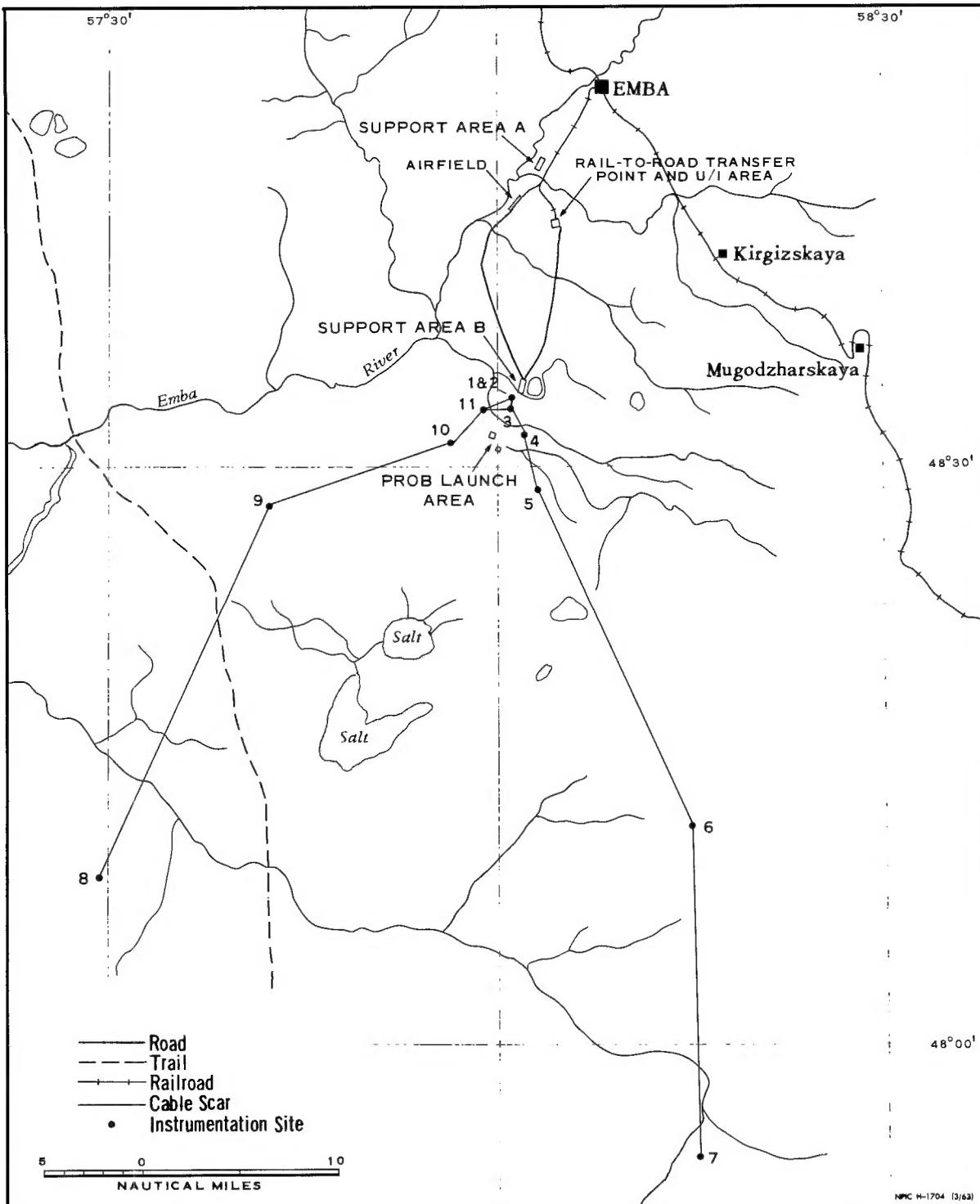


FIGURE 3. LAYOUT OF FACILITIES.

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field [redacted] and Saratov South Airfield [redacted]

e. GKAT transports based at Vladimirovka Airfield provide air support for the facilities at the Kapustin Yar/Vladimirovka Missile Test Center (KYMTC) and the Vladimirovka Advanced Weapons and Research Complex (VAWARC). On flights from Aktyubinsk to Chelkar these aircraft have always passed over Emba. Since January 1962, Emba has appeared from time to time in flight schedules as a via point and aircraft have been noted occasionally landing at or departing from Emba.

f. One visit by a GKAT aircraft based at Moscow/Khimki Airfield provides perhaps the only possible flight association between Emba and missile-related design and production installations. This aircraft is subordinate to a group believed to support the Special Design Bureau NII 456. [redacted]

[redacted] the aircraft (06110) flew at least to Chelkar and returned to base. A stop at Emba on this flight is undetermined. [redacted]

[redacted] the same aircraft flew from Moscow/Khimki Airfield to Emba and was scheduled to fly from Emba to Sary Shagan the next day. The significance of the stopover at Emba is not known.

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II. DESCRIPTION OF FACILITIES*

A. Support Area A

A major support area, (Area A), 5,000 by 3,000 feet, is located 5 nm south-southwest of Emba, on the east bank of the Emba River (Figure 4). It is served by six rail spurs, with a total length of approximately 7,000

* All measurements are accurate to \pm 10 percent.

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FIGURE 4. SUPPORT AREA A (OCTOBER 1962).

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feet. In addition, there are two major fenced areas. The northern one, 1,000 by 1,000 feet, contains 56 buildings which appear to comprise an administrative and housing area. The southern enclosed area, 950 by 650 feet, contains 33 buildings, most of which measure 130 by 30 feet and appear to be barracks or warehouses. There are approximately 25 other buildings in the vicinity, the largest of which is about 215 by 65 feet. Of the 114 buildings, 25 had been constructed between [redacted]

[redacted] Earth scarring suggests that construction of this support area is still in progress.

B. Airfield

Immediately southwest of Support Area A is a rail-served airfield with a single graded-earth runway, approximately 7,500 feet long by 650 feet wide. The only large building at the airfield is 130 by 30 feet. On [redacted] 3 large aircraft (probably transports) and 11 small unidentified aircraft were present. Electronic landing facilities are associated with the airfield. Grading activity is still in progress. Between [redacted] the width of the runway had almost doubled.

C. Rail-to-Road Transfer Point and Unidentified Area

The rail line continues 2.5 nm south-southwest of Support Area A to a rail-to-road transfer point. In the immediate vicinity is an unidentified rectangular area, 1,500 by 1,200 feet, which contains six buildings, the largest of which is 170 by 65 feet. A rail spur runs along one side (Figure 5).

D. Support Area B

Approximately 8 nm south of the rail-to-road transfer point is a second support area

(Area B) approximately 4,500 by 1,300 feet (Figure 6). It is bordered on the east by a small lake. The area has approximately 20 buildings, including 10 which are 130 by 30 feet. Two additional large buildings, 225 by 35 feet, are located east of the area on the southern shore of the lake. The area is 1,600 feet northeast of the rangehead instrumentation and probably is designed to provide technical support to the operations conducted there. Two roads lead west about 5 nm from Support Area B to a village of approximately 75 buildings. This village was present on 1960 photography but appears to have been expanded since that time. Other roads connect this village with the Support Area A, the airfield, and some of the instrumentation sites.

E. Probable Launch Area

1. Approximately 2.5 nm south-southwest of Support Area B is located a probable launch area with over-all dimensions of 1,600 by 1,300 feet (Figures 7 and 8). A double fence encloses the area which includes one large building, 200 by 100 feet, and two small buildings. The area is served by a central road with parallel peripheral roads which together form a rectangular pattern approximately 775 by 610 feet. These roads appear to be improved hard-surface roads. At the south end they appear to be slightly raised in order to maintain the same elevation throughout the road system. On the inside of the east peripheral road is a white square area about 75 feet on a side. Directly opposite on the inside of the west peripheral road is a similar-sized area but with an irregular eastern side. These areas appear to be uncompleted launch pads. However, the phasing of construction differs from that at other launch facilities which we have observed. For example, at other identified launch areas, the pattern has

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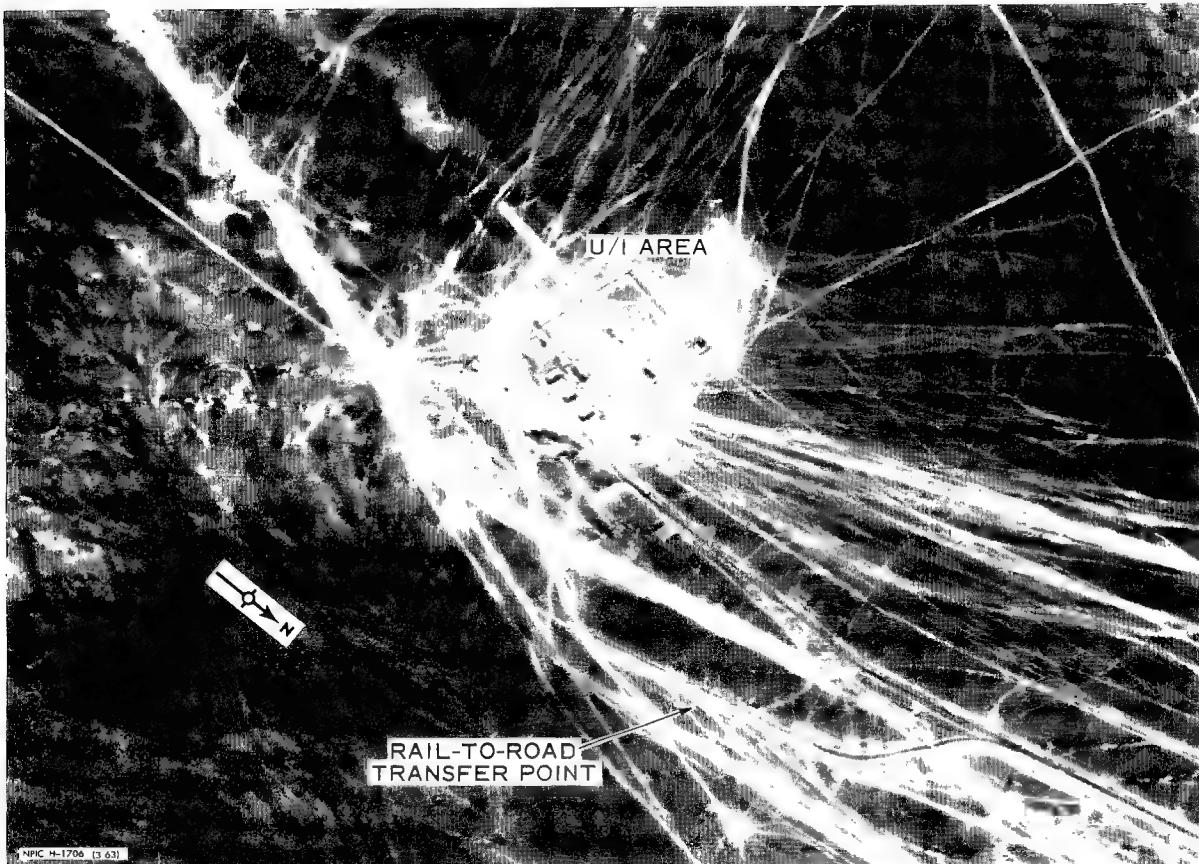


FIGURE 5. RAIL-TO-ROAD TRANSFER POINT AND UNIDENTIFIED AREA (OCTOBER 1962).

been to develop the launch pads before the other facilities in the launch area are improved. In this case, the process appears to be reversed.

2. To the northeast of the fenced area is a group of three small buildings which appear to be directly associated with the probable launch area. Outside the probable launch area the roads do not appear to be graded or surfaced to provide a smooth and finished access from the support facilities. It appears that we are viewing an installation which is still under construction.

3. Approximately 2,000 feet southeast of the probable launch area is a smaller double-fenced area with over-all dimensions of 1,000 by 790 feet. A few small buildings or bunkers

are discernible within the fenced area, but the quality of the photography precludes a detailed description of this area. There was no apparent change in this area between June and October 1962.

F. Communications Facilities

Examination of photographic coverage of Emba installation did not reveal any communications facilities such as rhombic antennas or microwave stations. It is not possible to say that the facilities do not exist because the scale of coverage may not reveal them. It can be assumed that at the Emba installation, for security reasons, communications

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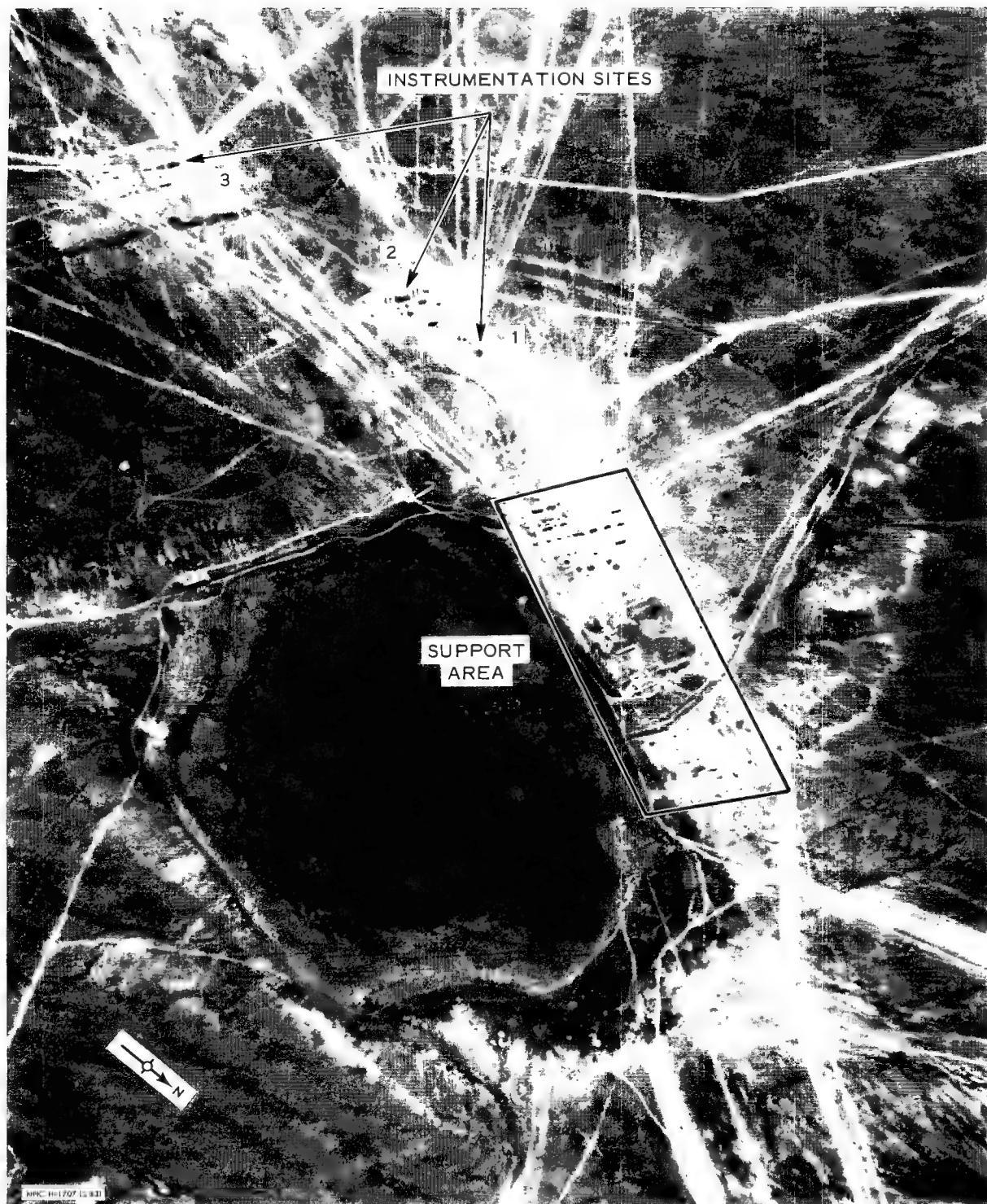


FIGURE 6. SUPPORT AREA B (OCTOBER 1962).

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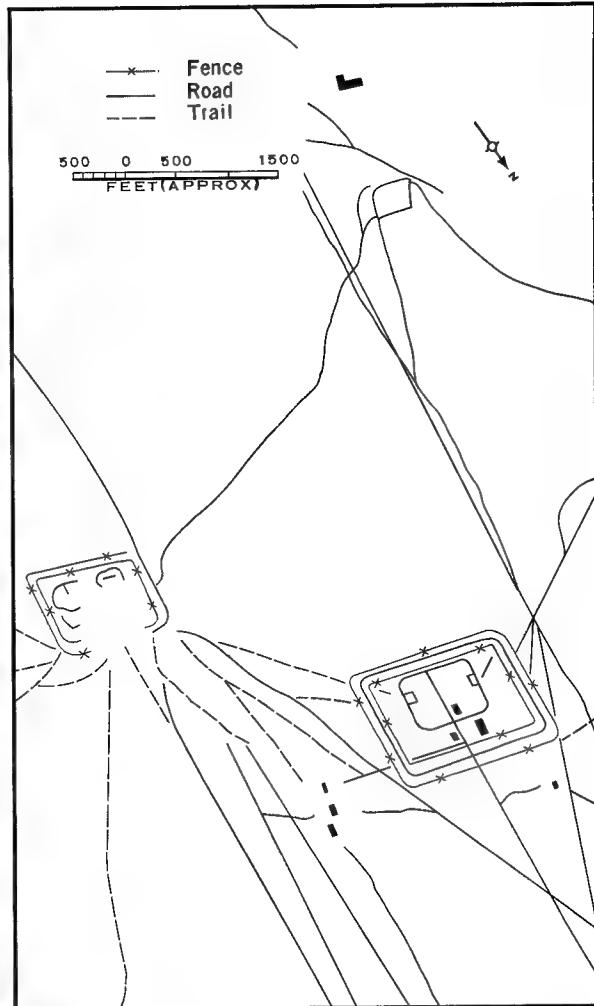


FIGURE 7. PROBABLE LAUNCH AREA (OCTOBER 1962).

between control authorities and operating stations are carried on landlines. To a degree, communications from the Emba installation and external authorities are also carried by landline. However, it should be expected that some emergency high-frequency radio communications also exist, since this practice is observed at other Soviet missile ranges.

G. Instrumentation

The probable launch area is surrounded by 11 distinct facilities which appear to be

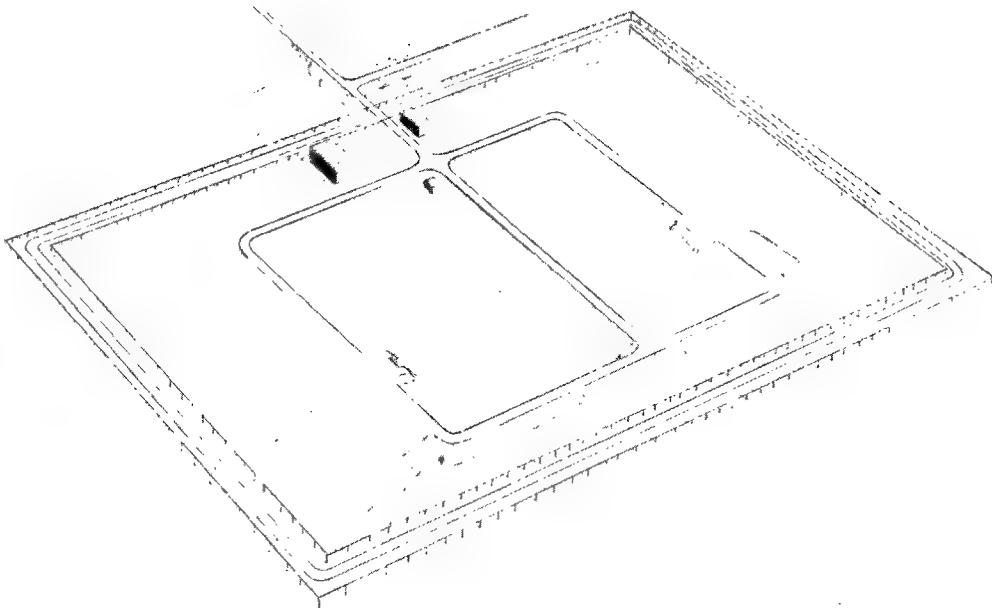
instrumentation sites. Five of these--sites 2, 6, 7, 8, and 9--are similar and extensively developed. Figure 9 shows instrumentation Site 6, which is typical of these five sites. Sites 1, 3, 4, 5, 10, and 11 are smaller than the others and cannot be described in detail from available photography. The identification of these facilities as instrumentation sites is based on the point-to-point interconnection of earth scars and the arrangement of the sites around the nominal line of flight. The major or long axis of buildings at sites 6, 7, 8, and 9 appears to lie parallel to and look-

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FIGURE 8. CONCEPT OF PROBABLE LAUNCH AREA.

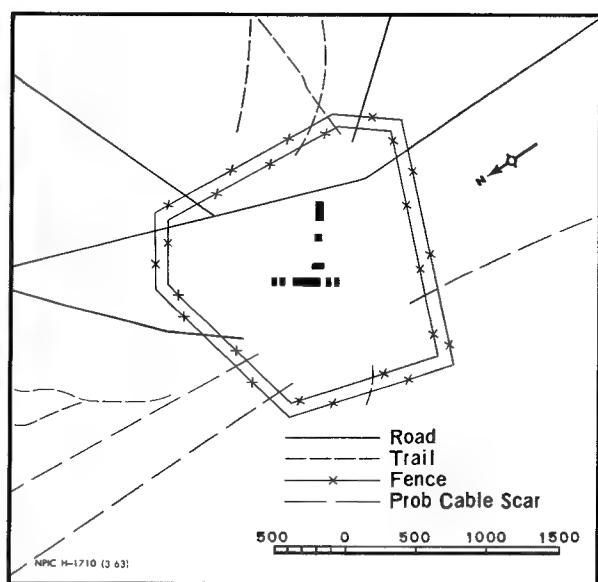
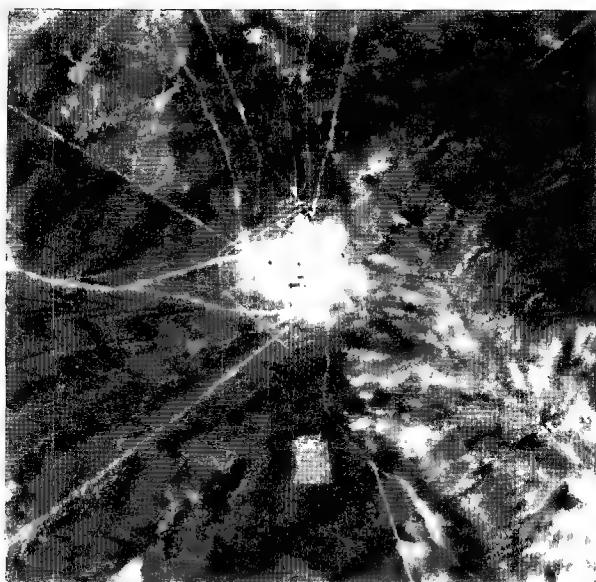


FIGURE 9. INSTRUMENTATION SITE 6 (AUGUST 1962).

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ing in toward the flight line while the axis of the buildings at site 2 is perpendicular to the range axis. Figure 10 shows the approximate distances between the sites and the perpendicular distances to the nominal line of flight. The area south of the range to the Iranian border was carefully studied on July and August 1962 photography, but no other identifiable instrumentation sites were observed.

III. ANALYSIS OF POSSIBLE FUNCTIONS OF THE EMBA FACILITY

A. General

1. The intense rate and volume of construction, supported by extensive rail yards and a logistics airstrip approximately 7,500 feet long, indicate that the new construction at Embar probably carries a high Soviet priority.

2. Available evidence points toward the fact that the Embar facility is related to missile testing or research and development.

a. Extensive support facilities and a probable launch area, with instrumentation sites radiating from the probable launch area, associate the facility with missile testing.

b. Flight activity associates this facility with research and scientific institutions dealing with electronics and missile-related functions.

3. Comparison with known Soviet SSM test range facilities

a. Road pattern--The road pattern within the double-fenced probable launch area at Embar resembles that at Launch Complex C, Tyura Tam Missile Test Center (TTMTC) -- Figure 11 -- and to a lesser extent those at launch facilities in Complex C, KYMTC, which are associated with MRBM, IRBM, and COSMOS satellite launchings. However, the turning radii of the roads in the probable launch area at

Embar appear to be smaller than those at other sites with similar road patterns.

b. Pad separation -- The distance between the possible pad locations at Embar is 775 feet, whereas the pad separations at Complex C, TTMTC, are 1,250 feet and 950 feet; the pad separation at Launch Area 2C, KYMTC, is 865 feet; and the pad separation at Launch Area 5C, KYMTC, is 750 feet and 650 feet, respectively, for the two sites.

c. Size of launch pads -- The possible launch pads at Embar measure 75 by 75 feet, whereas the pads at Complex C, TTMTC, measure approximately 180 by 120 feet; the smallest pad at Launch Area 2C, KYMTC, is approximately 240 by 180 feet; and the smallest pad at Launch Area 5C, KYMTC, is 265 by 60 feet.

d. Drive-through buildings -- The present lack of drive-through and drive-in buildings at the Embar facility is a feature which makes the Embar facility distinctly different from other Soviet SSM test facilities.

e. Instrumentation site pattern--The general bell-shaped pattern of instrumentation sites at Embar generally resembles the air defense instrumentation sites observed at KYMTC and the Shuang-cheng-tzu Missile Test Center (SCTMTC) in China; however, the individual sites themselves do not appear to be the same type.

4. Possible functions of the Embar facility are discussed in detail in subsequent paragraphs.

B. Operational Long-Range SSM Facility

1. In addition to the indications that Embar is a testing or research and development center as discussed above, existing evidence, admittedly incomplete, shows that it is not an operational SSM facility. This evidence is discussed below.

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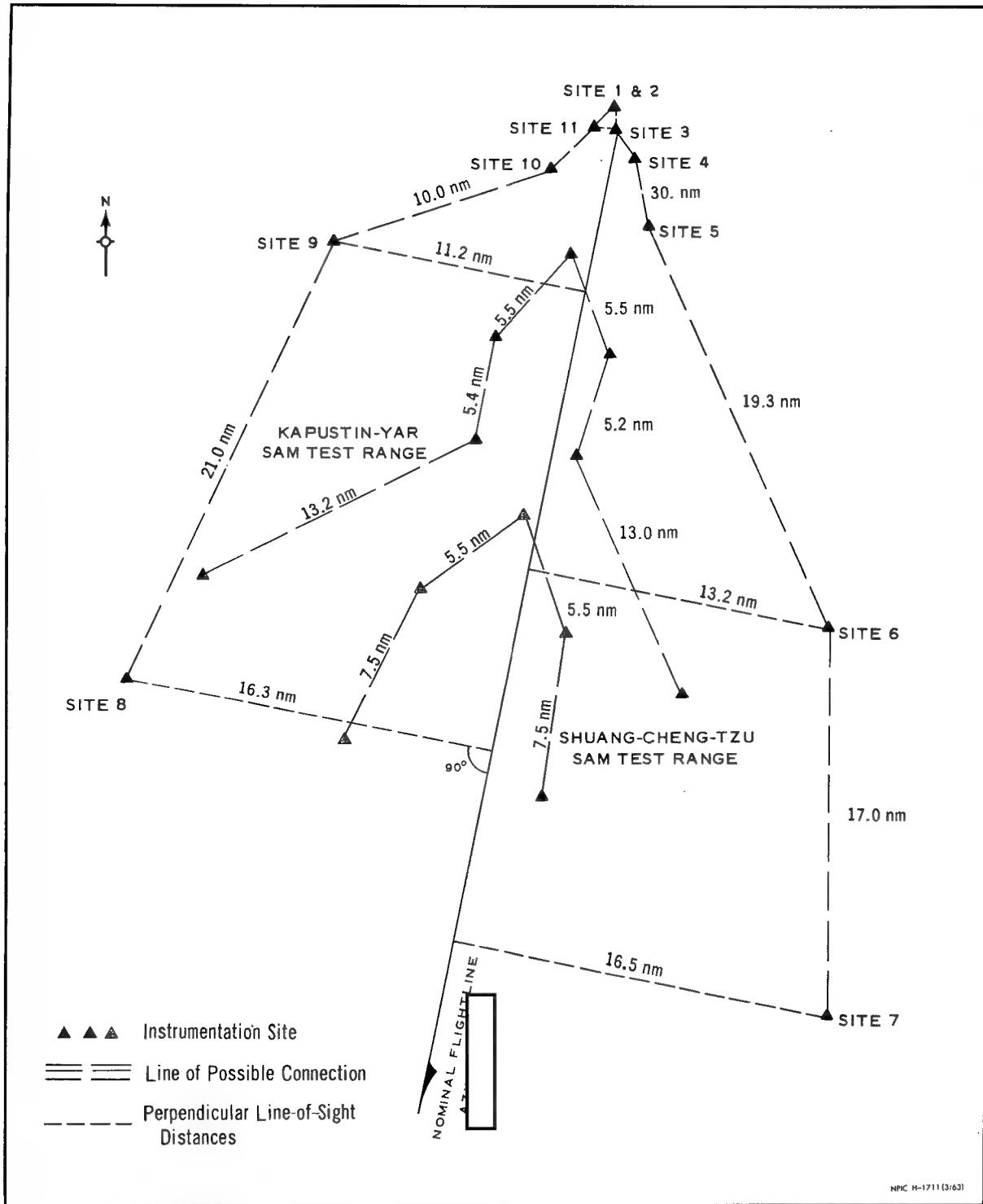


FIGURE 10. ARRANGEMENT OF INSTRUMENTATION SITES AT EMBA AND SAM TEST RANGES AT KYMTC AND SCTMTC.

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2. Except for the fact that the probable launch area appears to contain two launch pads located on parallel roads which are part of an improved road network forming a rectangular pattern, there is no resemblance between the Emba facility and any known operational ICBM site or complex (Figures 8 and 11). The differences are as follows:

a. The possible launch pads measure about 75 feet square while those at operational ICBM sites measure about 200 by 120 feet.

b. The separation between the possible launch pads is about 775 feet compared to a minimum of about 980 feet at Type II ICBM sites and 820 to 870 feet at Type IV ICBM sites.

c. Drive-through or drive-in missile-ready buildings seen at all operational ICBM sites have not been observed at this site.

d. The radius of road turns is much sharper than at operational ICBM sites.

e. No site support facility is evident.

f. The rail-to-road transfer point does not resemble the transfer point observed at operational ICBM complexes.

g. The Emba rail network consists of 6 spurs instead of the 3 to 4 observed at operational ICBM complexes.

3. With the possible exception of launch-pad separation, neither the probable launch area nor the adjacent facilities at Emba bear any resemblance to any deployed IRBM or MRBM complex or site (Figure 11). Major differences are as follows:

a. The possible launch pads at Emba are about 75 feet square compared to the circular or elongated launch-pad clearings measuring about 200 feet in diameter found at deployed MRBM and IRBM soft sites.

b. The drive-in or drive-through missile-ready buildings seen at all deployed MRBM and IRBM soft sites have not been observed at Emba.

c. The easily distinguished housing and support facilities found at all deployed MRBM and IRBM sites and complexes have not been observed at Emba.

d. None of the deployed MRBM or IRBM complexes or sites have rail support directly to the site support facilities as does the Emba facility.

C. Short-Range SSM Facility

1. Although we are reasonably confident that this installation is probably not for long-range ballistic missiles (600 nm and over), we cannot, on the basis of photography and site location, rule out the possibility that shorter-range surface-to-surface missiles may be involved. If this facility is designed for accommodating surface-to-surface missiles, the maximum distance that they can be fired is approximately 600 nm due to the southerly orientation of the facility and the location of the southern Soviet border.

2. If the intended range is no greater than 30 nm (consistent with the instrumentation pattern), the vehicles involved in such a program could be improved free rockets of the HONEST JOHN type, short-range guided rockets (possibly using a guidance concept of power-on throughout the flight in order to provide a standard trajectory), or short-range cruise missiles.

a. An improved free-rocket program does not seem likely since the Soviets already have a good capability, the chances for significant improvement are poor, and the required instrumentation in such a program is near the launcher.

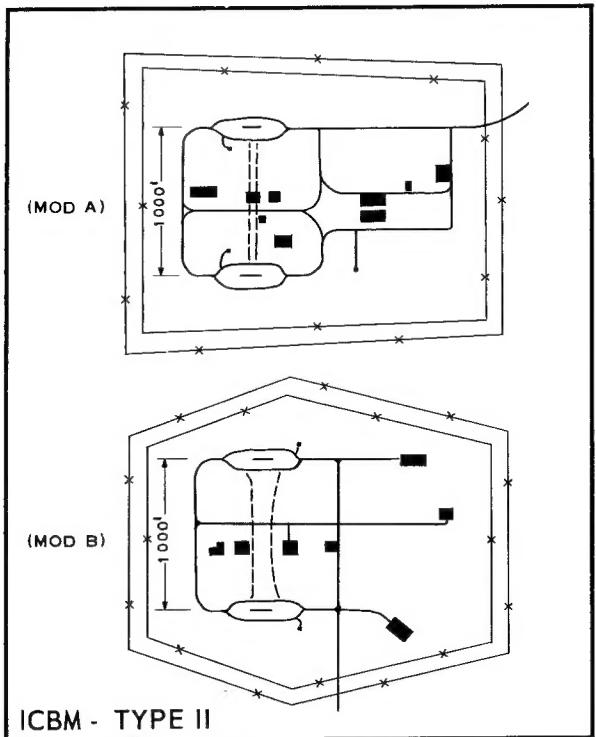
b. A short-range guided-rocket program could be adequately supported by the observed instrumentation pattern. Such a program is probably a Soviet requirement if they desire to improve significantly upon the accuracy of free rockets.

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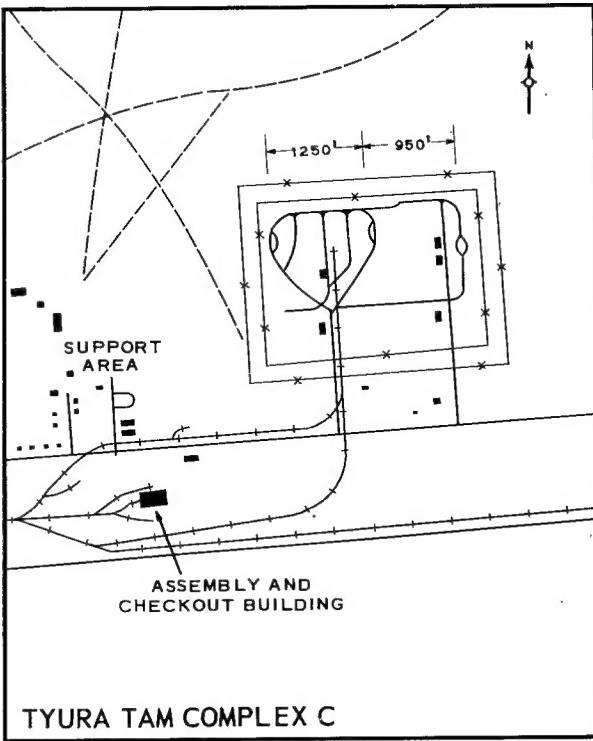
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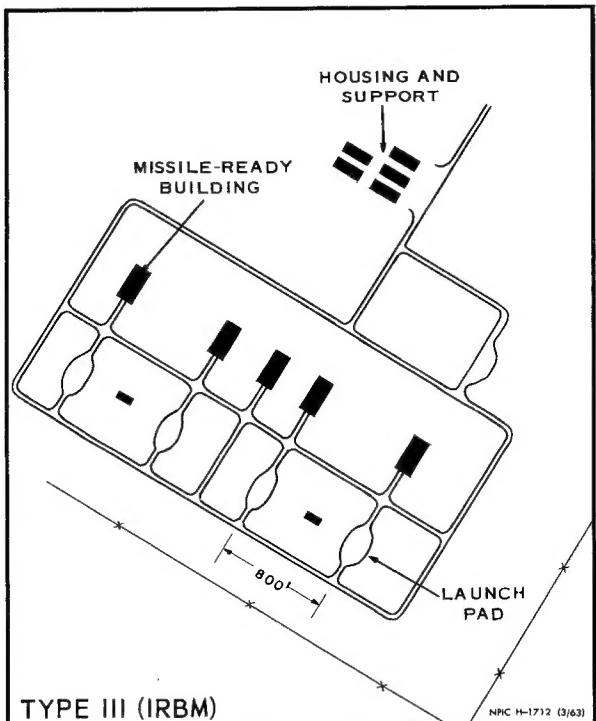
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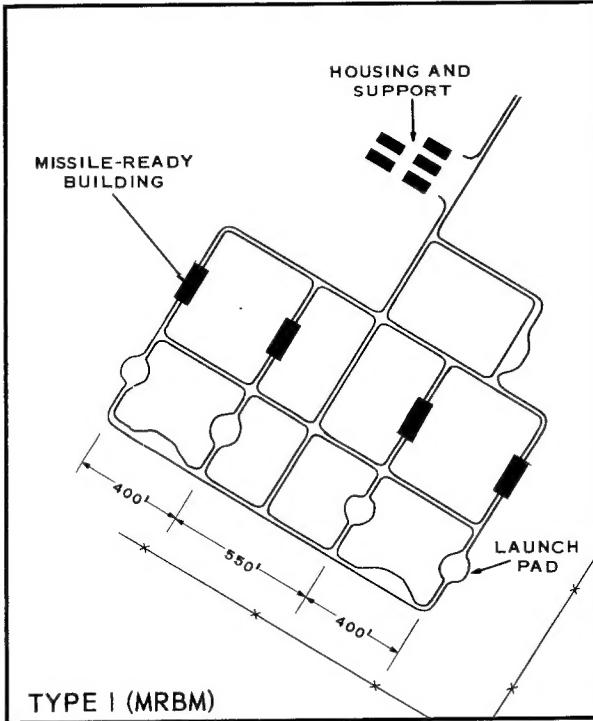
ICBM - TYPE II



TYURA TAM COMPLEX C



TYPE III (IRBM)



TYPE I (MRBM)

FIGURE 11. SELECTED TYPES OF SOVIET LAUNCH FACILITIES.

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c. A short-range cruise-missile development could be supported by this facility. There is good evidence that the Soviets have developed a cruise missile with a range of about 25 nm for use in the ground forces. The location of the development facility for this missile has never been identified by either COMINT or photography. However, it is possible that the development actually took place at a known development facility such as KYMTC but that the facilities and communications involved are not detectable with available collection means. Further, the time phasing of the Embo facility argues strongly that it was not involved in the early development of such missiles.

3. The observed instrumentation may be intended to measure only the powered flight portion of a ballistic rocket while within the general confines of the instrumentation pattern. The maximum range of such a system is very difficult to deduce since missiles of widely differing powered flight accelerations could still burn out within the general confines of the observed instrumentation.

D. SAM Range Facility

1. A comparison of the instrumentation sites at Embo with those in the SAM areas at KYMTC and SCTMTC in China reveals the same general bell-shaped pattern (Figure 10). However, there is more extensive instrumentation at Embo than at the other facilities.

2. Although there is no other feature of Embo which characterizes it as a SAM test range, such a mission remains a possibility.

E. ABM Range Facility

The lack of recognizable large radars and interferometers tends to discount Embo as a facility for the development of an ABM weapons system. The apparent orientation of the range

does not appear to allow the necessary range safety for missiles to be launched into the area. However, the presence of probable instrumentation sites within a distance of 35 nm indicates an intent for extensive data collection within a very limited range, possibly for testing antimissile systems for use against short-range tactical missiles. The probability of an ABM development program being undertaken at this installation appears unlikely in view of the extensive facilities available at the Sary Shagan Antimissile Test Center; however, we cannot eliminate the possibility that the Embo facility might be used for production testing of ABM components.

F. Antisatellite Development Facility

The heavy rail support provided the area and the general orientation of the range instrumentation argue in favor of a possible antisatellite role for the Embo facility. However, the present lack of identifiable large radars lessens the likelihood of this role at this time.

G. Launching Facility for Space Vehicles

1. General

The lack of rail support to the probable launch area, the size and configuration of the probable launch area in comparison with known SS-6 launch areas, and the lack of large missile-assembly and checkout facilities in the support areas indicate that space vehicles of the size of the SS-6 or larger cannot be accommodated at Embo.

2. Earth satellite vehicles

Small satellites probably could be launched into earth orbit, perhaps polar, from the Embo facility. The launching and support facilities appear adequate for this purpose. The following considerations, however, appear to discount such a use.

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a. The instrumentation and tracking facilities normally associated with a satellite launching complex have not been observed. No instrumentation down range has been identified. No FLIM FLAM stations between Emba and the southern border of the USSR have been found. Furthermore, there are no known Soviet tracking stations to the south of the USSR. The Soviet Antarctic station at Mirni offers a possible location for a tracking station, but it has not yet been so associated.

b. Satellite vehicles launched from Emba to the south (the anticipated flight line) would overfly foreign territory from about 650 to 2,000 nm and there would be a danger that an unsuccessful launch would result in impact on foreign soil.

3. Vertical probes

High-altitude vertical probes for the collection of scientific data in near-earth space could be easily supported from the Emba facility. Furthermore, the instrumentation pattern lends itself to covering vertical probes.

H. Special Purpose Facility

The Emba facility could be designed for a special purpose, such as conducting work of an unclassified nature which would permit the initiation of some international cooperation in space activities. On the other hand, the construction of this independent facility away from already established missile and space development centers may have been motivated

by a desire for special security or safety needs.

IV. OPERATIONAL STATUS OF THE EMBA FACILITY

The quality of the photography makes it difficult to determine the operational status of the Emba facility. In addition, since the facility cannot be associated with a particular missile system, we cannot rule out the fact that a relatively small missile can be launched from very rudimentary facilities. It appears, however, from the features listed below that construction at Emba was not completed when last observed in October 1962.

A. The road leading from the support facilities to the probable launch area is still relatively unimproved compared to the roads at the site itself.

the following changes occurred indicating that construction was still in progress.

1. About 25 buildings were added to Support Area A.
2. The airfield appeared to double in width.
3. The amount of open storage in one of the spur areas increased.
4. Construction of two of the instrumentation sites was probably completed.

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